



Bureau of Infectious Disease Control Infectious Disease Surveillance Section (IDSS)

2015-16 Influenza Season Summary Report for New Hampshire October 4, 2015 – May 21, 2016

In New Hampshire (NH), influenza is not a reportable disease, but surveillance systems are in place to help determine the extent of influenza morbidity and mortality in the State. During each influenza season (beginning of October through mid-May), a weekly influenza surveillance report is posted on the NH Department of Health and Human Services' website at the following link: <http://www.dhhs.nh.gov/dphs/cdcs/influenza/activity.htm>. In addition, a weekly assessment of influenza activity in NH is submitted to the Centers for Disease Control and Prevention (CDC) for inclusion in the weekly U.S. influenza surveillance report.

This report summarizes outpatient illness surveillance data reported by NH participants in the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) and by the Automated Hospital Emergency Department Data (AHEDD) system, virologic surveillance data from the NH Public Health Laboratories, and pneumonia and influenza mortality data from the NH Division of Vital Records Administration.

New Hampshire Surveillance

Outpatient Illness Surveillance

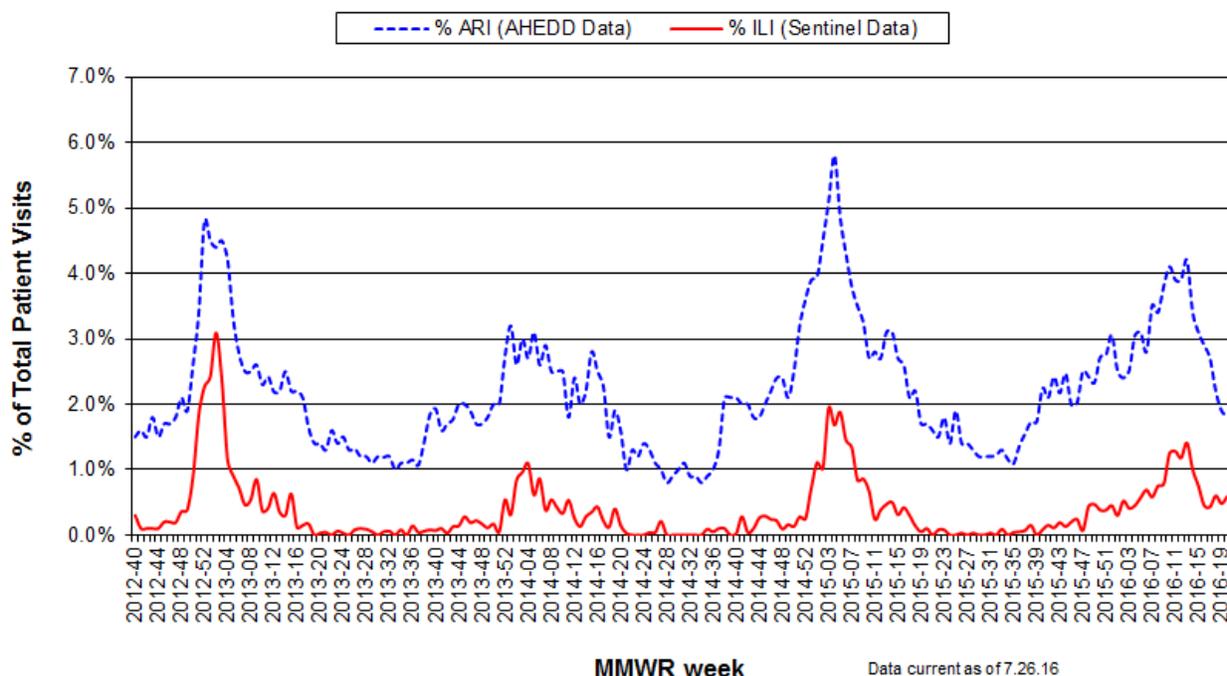
The two components of outpatient illness surveillance in New Hampshire are as follows:

1. **U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet):** Beginning in 1997, NH has participated in this collaborative effort between the Centers for Disease Control and Prevention, state and local health departments, and health care providers. For the 2015-16 influenza season, 24 NH health care providers participated. ILINet sentinel providers reported the proportion of patients who presented with influenza-like illness (ILI) on a weekly basis. ILI is defined as 1) a fever and 2) cough and/or sore throat, in the absence of a known cause. Participating providers were also asked to collect respiratory specimens from select patients and submit them to the PHL for viral subtyping.
2. **The Automated Hospital Emergency Department Data (AHEDD) system:** This system is a collaborative effort between NH acute care hospitals and the NH DHHS. The goal is for all 26 acute care hospitals in the State to participate in this system. For the 2015-16 influenza season, 26 hospitals electronically transmitted real-time data from emergency department encounters throughout the day to NH DHHS. Chief complaint text within the system was queried for complaints of acute respiratory illness (ARI) in patients seen in emergency departments. While ARI includes encounters that fit the definition of ILI above, it also includes encounters for complaints such as acute bronchitis or otitis media. Because these two systems collect information using different methods and represent different patient populations, it is expected that the proportions of ILI and ARI seen in these systems will differ. However, the overall trend of activity is expected to be similar.

For the 2015-16 season, reported ILI activity in NH reached its highest levels during MMWR weeks 11 and 13 (weeks ending March 19th and April 2nd 2016, respectively), when the percentage of patient visits to NH ILINet providers with patients presenting with ILI were 1.3% and 1.4%, respectively. The highest level of ARI reported through the AHEDD system was during week 13 (week ending April 2nd) when 4.2% of patient encounters in hospital emergency departments were due to ARI.

Using percent ARI and ILI together as indicators for when flu activity was highest, activity for the 2015-16 season peaked during week 13, when ARI and ILI were at 4.2% and 1.4%, respectively, which is much later timing for peak activity in the season compared to the previous 2014-15 season when highest activity was observed during week 4. This influenza activity peaked much later compared to what is typically seen for most seasons, and is the latest observed peak activity since formal influenza surveillance first began in NH. The 2015-16 season was less intense compared to the previous 2014-15 season, as indicated by comparing the peaks for ARI and ILI. For example during the 2014-15 season ARI and ILI peaked at 5.8% and 1.9%, respectively. See Figure 1 below for ILI and ARI reported during the 2015-16 season and the previous three influenza seasons.

Figure 1: Acute Respiratory Illness (ARI) & Influenza-like Illness (ILI) as a Percentage of Total Patient Visits Reported through the Automated Hospital Emergency Department Data (AHEDD) System and by NH ILINet Providers, 09/30/12 - 5/21/16



Reported Influenza-like Illness (ILI) by Age Group & Practice Type

During the 2015-16 influenza season, persons in the 5-24 year age group accounted for the greatest percentage (54.3%) of patients presenting with ILI reported by NH ILINet providers, followed by the 25-49 year age group (18.1%) then by the 0-4 year age group (17.5%). The next highest percentage ILI by age category was in the 50-64 year age group (6.8%) followed by the 65-plus year age group (3.4%). The percentages of ILI cases by age categories were observed to follow a different order of ranking compared to the previous 2014-15 season, with the percentage of ILI patients in the 0-4 year age

category swapping rank with the 50-64 year age category (i.e., the 0-4 year age category comprised a higher percentage than the 50-64 year age group in the 2015-16 season, which is consistent with A(H1N1)pdm09 as the predominant strain). Reported ILI by age groups for the 2015-16 influenza season is shown in Figure 2 and Table 1 below.

Each year there are typically some changes in NH healthcare providers who participate in the U.S. ILINet program. For the 2015-16 influenza season there were 24 providers enrolled in the ILINet program, which is a decrease compared to the previous season which had 29. At least 19 (79%) of the 24 providers reported on a regular basis throughout the season. The majority were family practice offices where patients of all ages are seen.

Figure 2: Influenza-like Illness (ILI) by Age Group and Practice Type as Reported by NH ILINet Providers, 2015-16 Influenza Season (10/04/15–5/21/16)

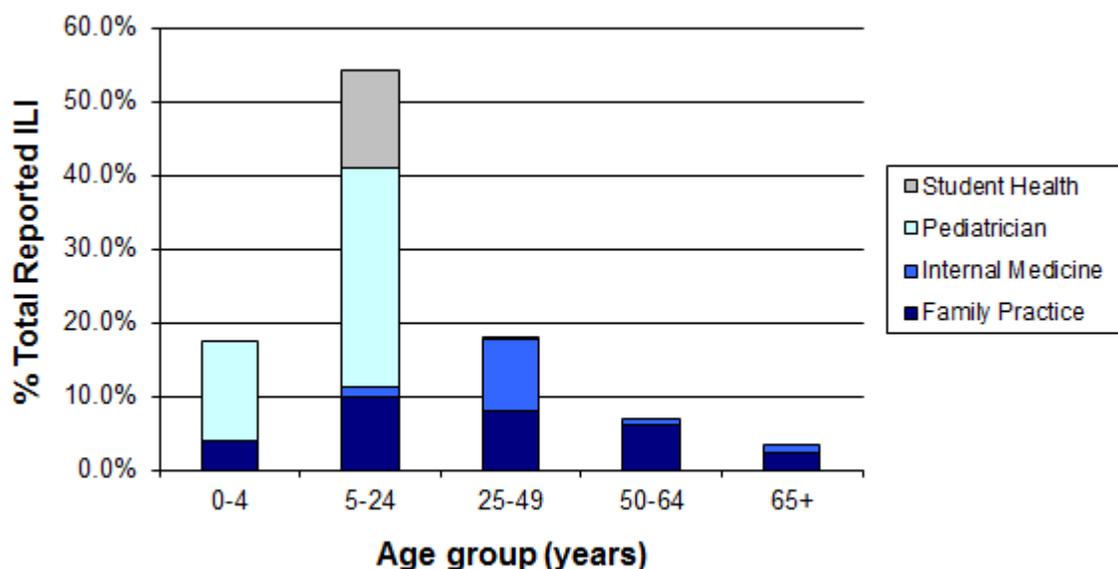


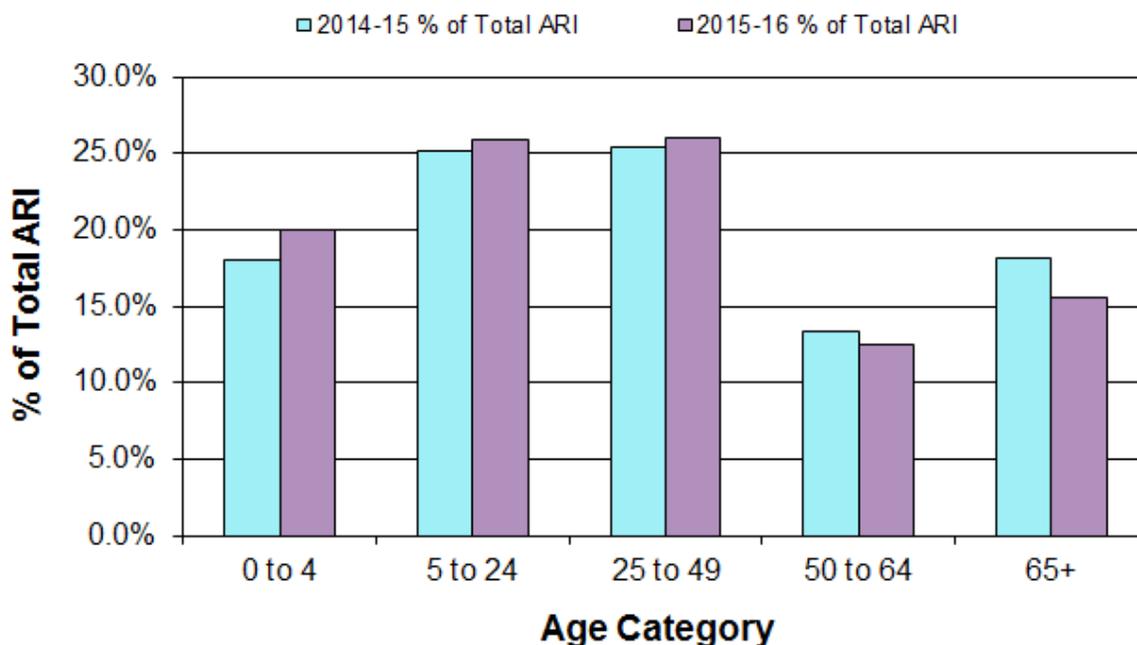
Table 1: Patient Visits for Influenza-like Illness (ILI) by Age Group and Practice Type, NH ILINet Providers, 2015-16 Influenza Season (10/04/15–5/21/16)

Practice type	Age Group (years)					Total ILI	Total Patient Visits
	0-4	5-24	25-49	50-64	65+		
Family Practice	32	78	64	48	18	240	93,917
Internal Medicine	0	12	76	6	9	103	13,644
Pediatrics	107	236	0	0	0	343	20,467
Student Health	0	106	4	0	0	110	12,209
Total	139	432	144	54	27	796	140,237
% of total ILI	17.5%	54.3%	18.1%	6.8%	3.4%		

Reported Acute Respiratory Illness (ARI) by Age Group

In the 2015-16 influenza season, persons in the 25-49 and 5-24 year age groups accounted for the largest percent of all ARI encounters in hospital emergency departments at 26.0% and 25.9%, respectively (see Figure 3 below). Age groups with the next highest percentage of ARI encounters include 0-4 (20.0%), 65-plus (15.6%), and 50-64 (12.5%). As seen in Figure 3, compared to the previous 2014-15 influenza season, the percentage distributions by age category were slightly higher in the three youngest age categories, and lower in the two oldest age categories, which is consistent with the predominant circulating strain being A(H1N1)pdm09.

Figure 3: Acute Respiratory Illness (ARI) by Age Group as Reported by NH Automated Hospital Emergency Department Data (AHEDD) System, 2015-16 Influenza Season (10/04/15 – 5/21/16) (N = 10,776 ARI encounters) and 2014-15 Influenza (9/28/14 – 5/23/15) (N = 11,457 ARI encounters)



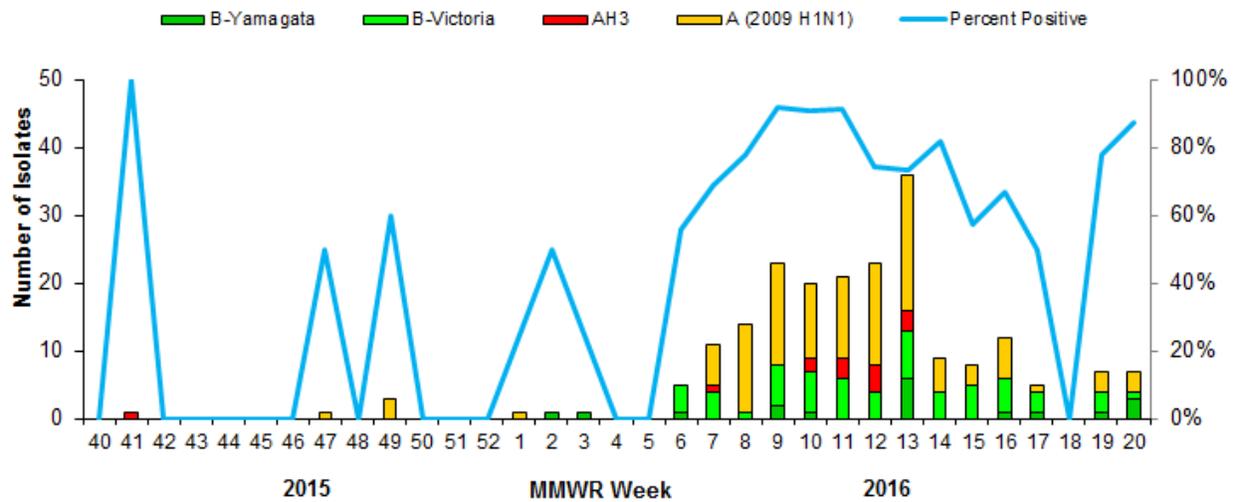
Laboratory Surveillance

The NH Public Health Laboratories (PHL) receives respiratory specimens for influenza testing from ILINet providers, other health care providers and hospitals throughout the State, and from respiratory outbreak settings such as in long-term care facilities. Testing is important to identify circulating influenza viral subtypes, and to confirm specimens that test positive by rapid test. Typically, a large majority of specimens submitted to the PHL have previously tested positive by rapid test in health care provider offices or hospital laboratories. Therefore, it is expected that a high percentage of specimens received by the PHL for influenza testing will be positive. This was observed in the previous 2012-13, 2013-14, 2014-15 seasons when 59%, 54%, and 57% of total submitted specimens, respectively, tested positive. During the 2015-16 season 71% (n=209) of 296 total specimens submitted tested positive for influenza.

The number of positive specimens and subtypes reported for each MMWR week of the 2015-16 season is shown in Figure 4. The first positive specimen was detected near the start of the flu season during

MMWR week 41 in early October, when one specimen tested positive for influenza A (H3). Figure 4 depicts a peak for the number of positive specimens (n=36 positive specimens) during week 13 (last week of March) of 2016, which is much later than what is typically seen during other regular flu seasons when the highest number of positives tend to occur in the month of February (e.g., typically during weeks 6 through 9). The peak week for positive specimens (week 13) coincides with same week when combined ARI and ILI activity peaked, which is consistent with what is normally observed over previous influenza seasons.

Figure 4: Influenza Virus Isolates, by Viral Subtype, NH Public Health Laboratories, 2015-16 Influenza Season (10/04/15 – 5/21/16) (N = 296)



The three different viral subtypes that circulated in NH during the 2015-16 influenza season are presented in table 2. Positive isolates consisted of 56.5% influenza A(H1N1)pdm09, 6.7% influenza A (H3), 36.8% influenza B (both Yamagata and Victoria lineage). In comparison during NH’s 2014-15 season positive isolates consisted of 0.4% influenza A(H1N1)pdm09, 95.3% influenza A (H3), 4% influenza B, and 1 (0.2%) co-infection with influenza A(H3) and B. Compared to the previous 2014-15 season a much higher percentage of specimens tested positive for influenza A(H1N1)pdm09 and for influenza B, and lower percentage was positive for influenza A(H3). The NH PHL developed capabilities to test for influenza B lineage, and each of the two lineages were reported out in weekly reports throughout the season. The first influenza B detections this season occurred during week 2, and these viruses were detected consistently between weeks 6 through 20 with only one week (week 18) when there was no influenza B detected. Of the 77 total influenza B viruses detected, 59 (76.6%) were B-Victoria and 18 (23.4%) were B-Yamagata. With influenza B comprising 36.8% of the total positive specimens detected, this represents a much higher percentage of the total than what is normally seen.

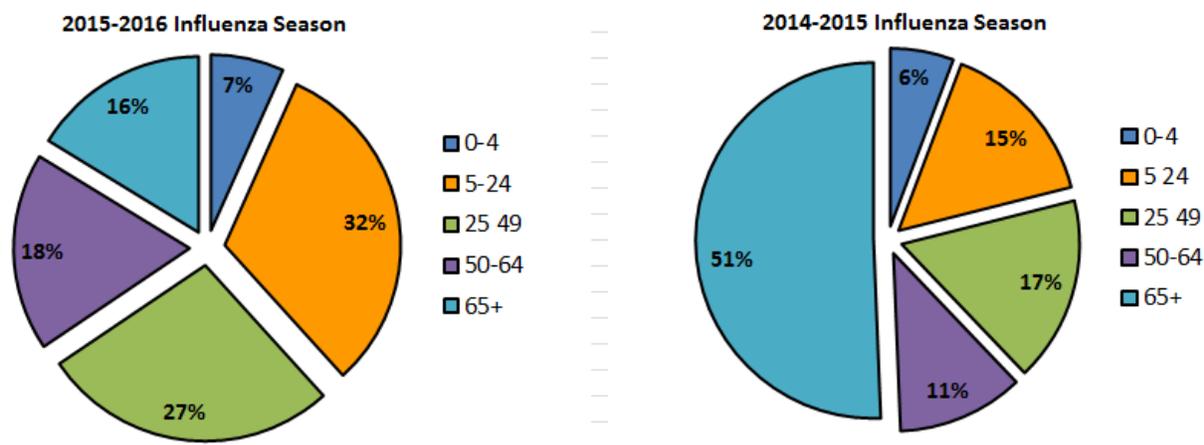
Table 2: Results of Specimens Received by NH Public Health Laboratories, 2015-16 Influenza Season (10/04/15 – 5/21/16)

Results	# Specimens	% of total positive
Influenza A (H3)	14	6.7%
2009 influenza A (H1N1)	118	56.5%
Influenza B Victoria	59	28.2%
Influenza B Yamagata	18	8.6%
Negative for influenza	86	
Inconclusive/invalid	1	
Total	296	

Influenza test results reported by CDC for the New England region as a whole indicated the following percentages of each subtype (denominator equals specimens with known subtypes): 7.3% influenza A (H3), 70.0% influenza A(H1N1)pdm09, and 22.7% influenza B. Compared to regional New England data NH had a similar percentage of total positive for influenza A (H3) (6.7% vs 7.3%), a lower percentage of influenza A(H1N1)pdm09 (56.5% vs 70.0%), and a greater percentage of total positives for influenza B (36.8% vs 22.7%). Subtypeable flu results breakdown for the New England Region were slightly different when compared to the national test results, with a lower percentage for influenza A (H3) (7.3% vs. 13.6%), a higher percentage positive for influenza A(H1N1)pdm09 (70.0% vs 56.6%), and a lower percentage for influenza B (22.7% vs. 29.9%).

Figure 5 below further describes PHL influenza test results for NH according to different age groups. Compared to the 2014-15 season a much greater percentage of positive specimens were observed in the 2015-16 season for the 5-24 (32% vs. 15%), 25-49 (27% vs 17%) and 50-64 (18% vs 11%) year age groups, while the 65+ year age group comprised a much lower percentage of the total (16% vs. 51%).

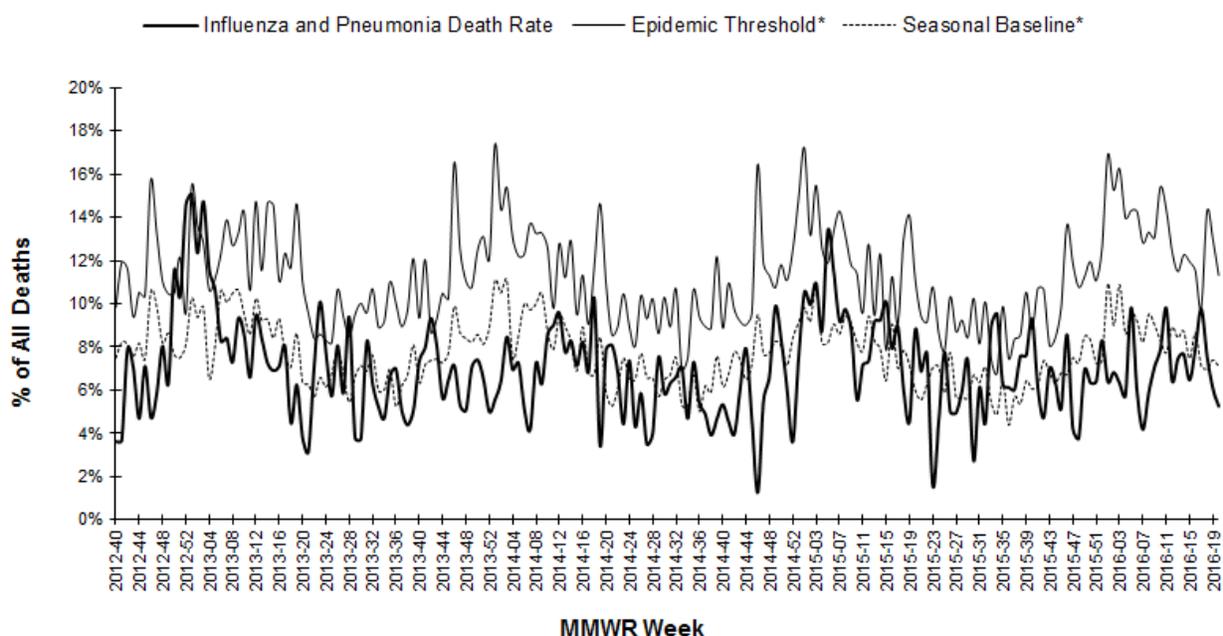
Figure 5: Age Distribution of Laboratory Confirmed Influenza, NH Public Health Laboratories, 2015-16 Influenza Season (10/04/15 – 5/21/16) and 2014-15 Influenza (9/28/14 – 5/23/15)



Pneumonia and Influenza (P&I) Mortality

Pneumonia and Influenza (P&I) deaths in New Hampshire are identified through review of electronically filed death certificates by looking at the causes of death listed on each death certificate. The following graph, which shows the proportion of deaths attributed to P&I, represents all deaths recorded by NH's Division of Vital Records Administration. This includes resident and non-resident deaths that occurred within the State, and may not include deaths of NH residents that occurred out-of-state, or cases being investigated by the Medical Examiner's Office.

Figure 6: Pneumonia and Influenza Mortality, New Hampshire, MMWR Week 40 2012 to MMWR Week 20 2016 (9/30/12 – 5/21/16)



**Seasonal baseline is calculated using the previous 5 years of data. If the proportion of P&I deaths for a given week exceeds the baseline value for that week by a statistically significant amount (1.645 standard deviations), then P&I deaths are said to be above the epidemic threshold, and the proportion of deaths above threshold are considered attributable to influenza.*

During the 2015-16 influenza season, the percent of all deaths recorded in NH that were reported as due to P&I remained below the weekly epidemic threshold, except for one week, MMWR week 40, when the threshold was exceeded (see Table 3 below).

Table 3. Percent of Total Reported Deaths in NH Attributed to Pneumonia and Influenza (P&I) Above the Epidemic Threshold by MMWR Week, 2015-16 Influenza Season (10/04/15– 5/21/16)

MMWR Week	Dates	P&I Deaths (% of Total Deaths)	Weekly Epidemic Threshold
2015-40	10/04/15 - 10/10/15	9.3%	8.8%

Based on electronic surveillance of death certificates a total of 19 influenza-associated NH deaths (i.e., deaths where influenza is specifically listed as a cause or contributing cause of death on the death certificate) were observed during the 2015-16 influenza season, which is within the range of deaths observed during other seasons since NH first began tracking this parameter in 1997. This is comprised of eighteen adults plus one pediatric influenza-related death. The counties of residence for persons with identified influenza-related deaths include Belknap, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham and Strafford.

Influenza Activity in New Hampshire as Assessed by the State Epidemiologist

Influenza activity levels in NH are reported each week to CDC to be included in the national weekly influenza surveillance report. Such activity levels help to describe the degree of geographic distribution of influenza activity. CDC defines influenza activity levels as follows:

- **No Activity:** Low ILI activity and no laboratory-confirmed cases of influenza.
- **Sporadic:** Low ILI activity and isolated laboratory-confirmed influenza cases or a single influenza outbreak has been reported.
- **Local:** Increased ILI activity or influenza outbreaks in a single region of the state, and recent laboratory-confirmed influenza in that region.
- **Regional:** Increased ILI activity or influenza outbreaks in ≥ 2 , but less than half of state regions, and recent laboratory-confirmed influenza in affected regions.
- **Widespread:** Increased ILI activity or influenza outbreaks in at least half of state regions, and recent laboratory-confirmed influenza in the state.

In NH, the reported influenza activity level is based on ILI and ARI reported by the Sentinel Providers and the AHEDD surveillance systems respectively, reports of laboratory confirmed influenza, and reported outbreaks in facilities.

In the 2015-16 season, geographic distribution of influenza activity was at a level of either no activity, sporadic, or local activity from weeks 40-48, with the first sign of clearly increased activity observed at week 49 (week ending December 12, 2015), when it reached regional activity. Starting at week 51 of 2015, with the exception of two weeks (i.e., weeks 2 and 19) activity remained at either regional or widespread for a span of 22 weeks, lasting through week 20 of 2016. Activity declined to local or sporadic during weeks 21-23 before reaching of no activity during week 24.

National Surveillance

CDC reports that this was a moderate influenza season, with a lower percentage of outpatient visits for ILI, lower hospitalization rates, and lower percentage of deaths attributable to P&I compared with the preceding three seasons. During the 2015-16 season, of the subtypeable viruses, influenza A(H1N1)pdm09 viruses predominated nationally (57%), with less influenza B viruses (30%) and even smaller percentage of influenza A(H3) identified (14%). Although influenza A(H1N1)pdm09 predominated overall, influenza A(H3) viruses were more commonly identified from October to early December, and influenza B viruses were more commonly identified from mid-April through mid-May. The majority of viruses characterized this season were antigenically similar to the reference viruses representing the recommended components of the 2015-16 Northern Hemisphere influenza vaccine.

Based on the percentage of specimens testing positive for influenza the national peak of influenza activity occurred during week 10 (week ending March 12, 2016). While there were some differences

among U.S. Department of Health and Human Services regions observed in the timing of influenza activity (based on percentage of specimens testing positive), region 1 (comprised of the six New England states) also peaked during week 10.

CDC has antigenically and/or genetically characterized 2,616 influenza viruses collected and submitted by U.S. laboratories since October 1, 2015, including 997 influenza A(H1N1)pdm09 viruses, 625 influenza A(H3N2) viruses, and 994 influenza B viruses. Among the 997 influenza A(H1N1)pdm09 viruses characterized, 996 (99.9%) were found to be antigenically similar to A/California/7/2009, the reference virus component of the 2015-16 Northern Hemisphere influenza vaccine. One (0.1%) of the A(H1N1)pdm09 viruses tested showed a reduced titer to A/California/7/2009. Although all recent influenza A(H1N1)pdm09 viruses belong to hemagglutinin (HA) genetic groups 6B, two genetic subgroups, 6B.1 and 6B.2, have emerged, with the majority of U.S. viruses belonging to 6B.1. To date, viruses from these genetic subgroups remain antigenically similar to the A/California/7/2009 virus component in the vaccine. All 625 influenza A (H3N2) viruses were genetically sequenced, and all viruses belonged to genetic groups for which a majority of viruses antigenically characterized were similar to cell-propagated A/Switzerland/9715293/2013, the reference virus representing the influenza A(H3N2) component of the 2015-16 Northern Hemisphere vaccine. A total of 548 influenza B/Yamagata viruses were characterized, and all were found to be similar to B/Phuket/3073/2013, the reference virus representing the influenza B/Yamagata-lineage component of the 2015-16 Northern Hemisphere trivalent and quadrivalent vaccines. A total of 446 influenza B/Victoria-lineage viruses were characterized, and 439 (98.4%) were found to be similar to B/Brisbane/60/2008, the reference virus representing the influenza B/Victoria-lineage component of the 2015-16 Northern Hemisphere quadrivalent vaccine. Seven (1.6%) of the B/Victoria-lineage viruses tested showed reduced titers to B/Brisbane/60/2008.

The Food and Drug Administration has recommended that the 2016–17 influenza trivalent vaccines used in the United States contain an A/California/7/2009 (H1N1)pdm09- like virus, an A/Hong Kong/4801/2014 (H3N2)-like virus, and a B/Brisbane/60/2008-like virus (B/Victoria lineage). For the quadrivalent vaccines, which have two influenza B viruses, the FDA recommended these contain the viruses recommended for the trivalent vaccines, as well as a B/Phuket/3073/2013-like virus (B/Yamagata lineage). This represents a change in the influenza A (H3N2) component and a change in the influenza B lineage included in the trivalent vaccine compared to the 2015–16 influenza vaccine.

During the 2015-16 season, based on data from CDC’s National Center for Health Statistics Mortality Surveillance System, the proportion of deaths attributed to P&I was at or slightly above the epidemic threshold for 3 consecutive weeks, spanning from week 52 through week 2, and again for 4 consecutive weeks spanning from week 8 through week 11. The percentage of deaths attributable to P&I peaked at 7.9% during week 11 (week ending March 19, 2016).

Regarding pediatric influenza associated mortality, there were 74 laboratory-confirmed deaths reported from Puerto Rico, the District of Columbia, and 31 states (one was reported in New Hampshire). Among the 74 deaths, 29 were associated with an influenza A(H1N1)pdm09 virus infection, 3 were associated with A(H3N2) virus infection, 17 were associated with an influenza A virus infection for which no subtyping was performed, 23 were associated with influenza B virus infection, and two were associated with an influenza virus for which the type was not determined. As a reference, since influenza-associated pediatric deaths became nationally notifiable in 2004, the total number has ranged from 37 to 171 per season (excluding the 2009 pandemic when there were 358 such deaths reported between April 15, 2009-October 2, 2010).

Based on national data reported to CDC via ILINet, for the 2015-16 influenza season, influenza activity as measured by percentage of outpatient visits for ILI peaked nationally during week 10 (i.e., week ending

March 12, 2016) at 3.6%, and was substantially lower and much later in the season than the previous season's peak (6.0%).

The Centers for Disease Control and Prevention influenza season summary report can be found on the CDC website at <http://www.cdc.gov/flu/>.

Report Date: 8/17/16

Prepared by: John Dreisig, MPH

JDreisig@dhhs.state.nh.us / 603-271-6585

All data in this report are based upon information provided to the New Hampshire Department of Health and Human Services under specific legislative authority. The numbers reported may represent an underestimate of the true absolute number and incidence rate of cases in the state. The unauthorized disclosure of any confidential medical or scientific data is a misdemeanor under New Hampshire law. The department is not responsible for any duplication or misrepresentation of surveillance data released in accordance with this guideline.